PREPRINT NO. 98-41

NEW SIEMENS 16 MM PROJECTOR AMPLIFIERS

BY

NORBERT ENGELS

R & H PRODUCTS LTD.,
MONTREAL, QUE.

PRESENTED AT THE *SMPTE*
98th TECHNICAL CONFERENCE
NOVEMBER 1-5, 1965

Additional preprints may be obtained by sending request and remittance to the:

SOCIETY OF MOTION PICTURE & TELEVISION ENGINEERS INC.
9 East 41st Street New York, N.Y. 10017

Produced in co-operation with BROADCASTING and COMMUNICATIONS

THIS MATERIAL WAS PRINTED IN CANADA

Conference Price
.25
An increased price will be in effect for mail orders.

November 2, 1965

NEW SIEMENS 16mm PROJECTOR AMPLIFIERS

by

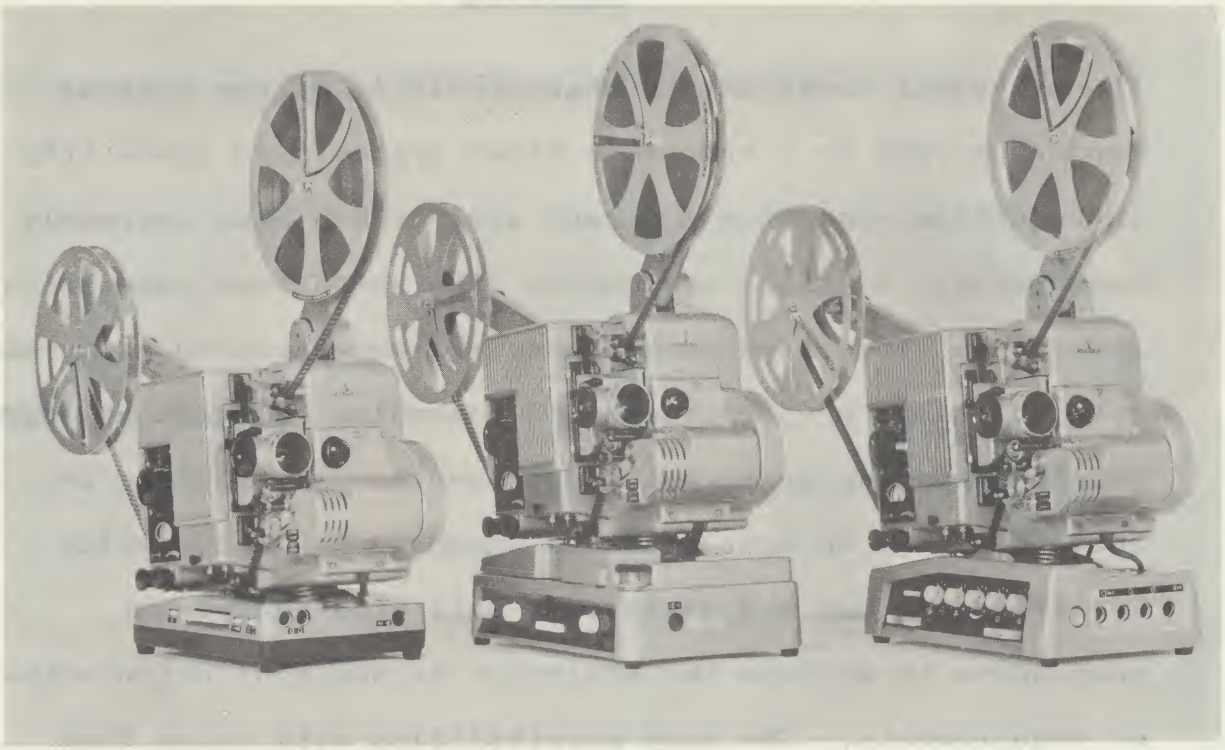
NORBERT ENGELS

R & H PRODUCTS LTD.

MONTREAL

The principal construction characteristic of the Siemens Projector 2000 is a component block system, and since it's introduction more than a decade ago, it has been extremely successful. Suitable components like sound head assemblies, amplifiers, 16mm tape decks, etc. are manufactured, separately from the basic projector and are assembled to basic standard models depending on market requirements. It is therefore quite feasible in most cases to expand a projector which is already in use and equip this unit with additional components to up-date the projector to new projection methods, or requirements. The many possibilities with which 16mm sound film can be used makes it necessary to offer a variety of amplifiers with different characteristics and power out-puts. Three new transistorized amplifiers have been designed recently for this component block system and are now included in the production. (Fig. 1)

The experience gained from the introduction of the first 2 Watt transistor socket amplifier in 1963 has been carefully



65B322B

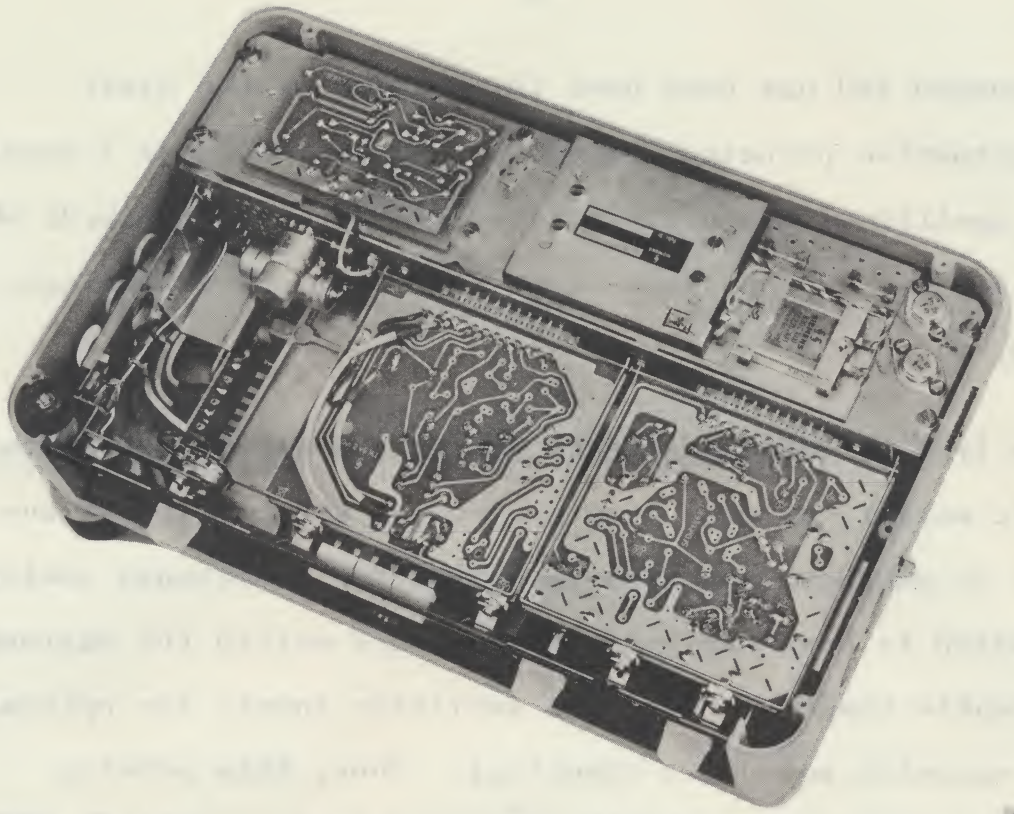
FIG. 1

Three new amplifiers mounted with the projectors

evaluated and has been used in deciding on the basic construction principal of the new amplifiers. As a result all amplifiers feature complete printed circuit boards which are mounted in the lightweight aluminium alloy housings. (Fig. 2)

This type of metal enclosure not only helps to reduce the basic weight, as most 16mm projectors are carried at one time or another, but also is useful for additional cooling required to keep the power transistors within the maximum tolerable temperatures. All amplifier inputs for optical and magnetic sound are identical. Thus, this permits complete interchangeability of sound head assemblies without necessary electrical matching and consequently simplifies production.

The input sensitivity for the optical sound is .5 mV, on 1.8 k impedance, whereas the input for the magnetic sound is 1.2 mV, on 3 k. Due to the high input sensitivities some remarkable gain reserves are available which will assure proper sound reproduction if a poorly recorded sound track is reproduced. (Fig. 3) A 3 Watt Exciterlamp, type BRK is used in all optical sound head assemblies, contrary to previous models. A DC bias supply powers the Exciterlamp which is voltage controlled over a transistor circuit. This



65B170B

FIG. 2

Chassis and printed socket board layout of 12 Watt amplifier

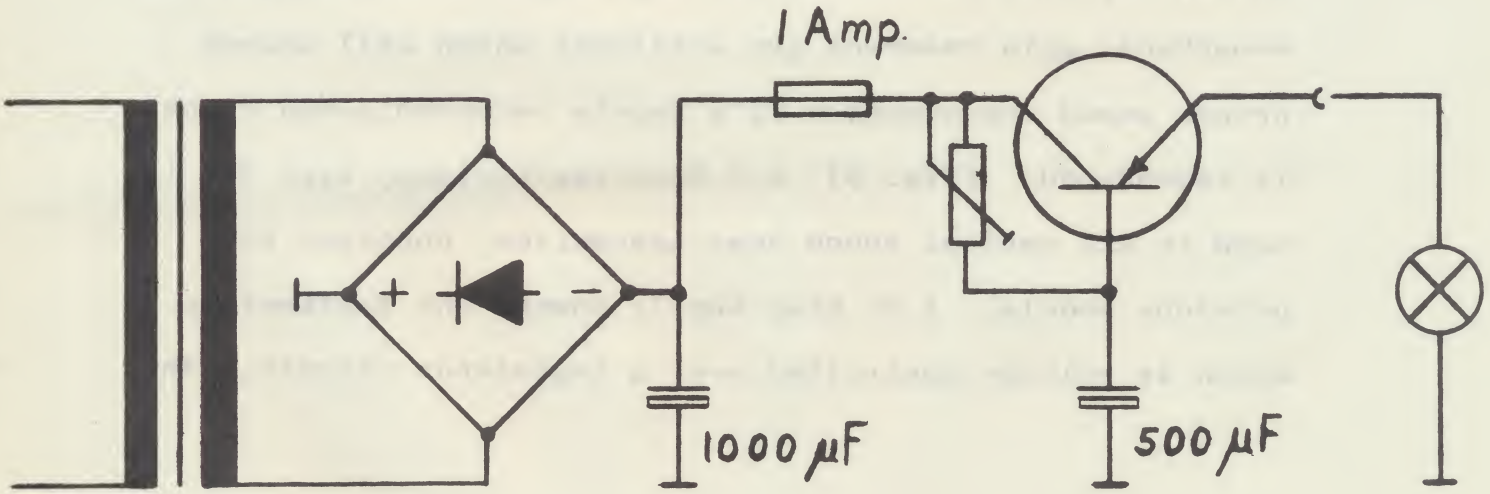


FIG. 3

DC Exciterlamp circuit

system is used on all amplifiers. A small photo transistor, operating without DC bias supply is installed in the input circuit of the optical sound doing away with a transformer matching to the first transistor pre-amplifier.

A similar voltage stabilizing circuit is used to power the transistors of the amplifier. This circuit is not only extremely stable but also produces sufficient current so that bass tones by maximum gain can be reproduced in full fidelity thus minimizing the general all-over distortion.

All amplifier inputs such as microphone, phono and tape have been demensioned to have the same input impedance for each amplifier. The input sensitivity for a microphone is .8 mV low impedance 200 OHM.

The signal to noise ratio on all amplifiers against full output, measured on the inputs optical sound, microphone, and phono is higher than 55 db. On magnetic playback the signal to noise ratio is higher than 45 db measured with standard German test film DIN 15638. Extensive Mu-metal shieldings on the magnetic heads as well as a complete Mu-metal enclosure of the motor help to eliminate outside interferences. (Fig. 4) A distortion of 5% is measured between the frequency range of 60 cycles and 10 kc on full output, whereas the constant signal of 1 kc produces less

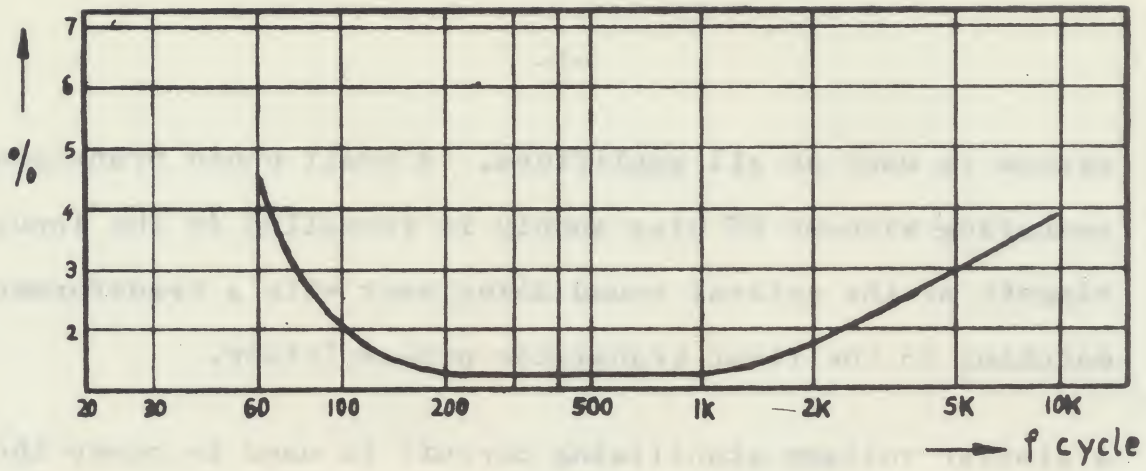


FIG. 4

Harmonic distortion by 1 Watt

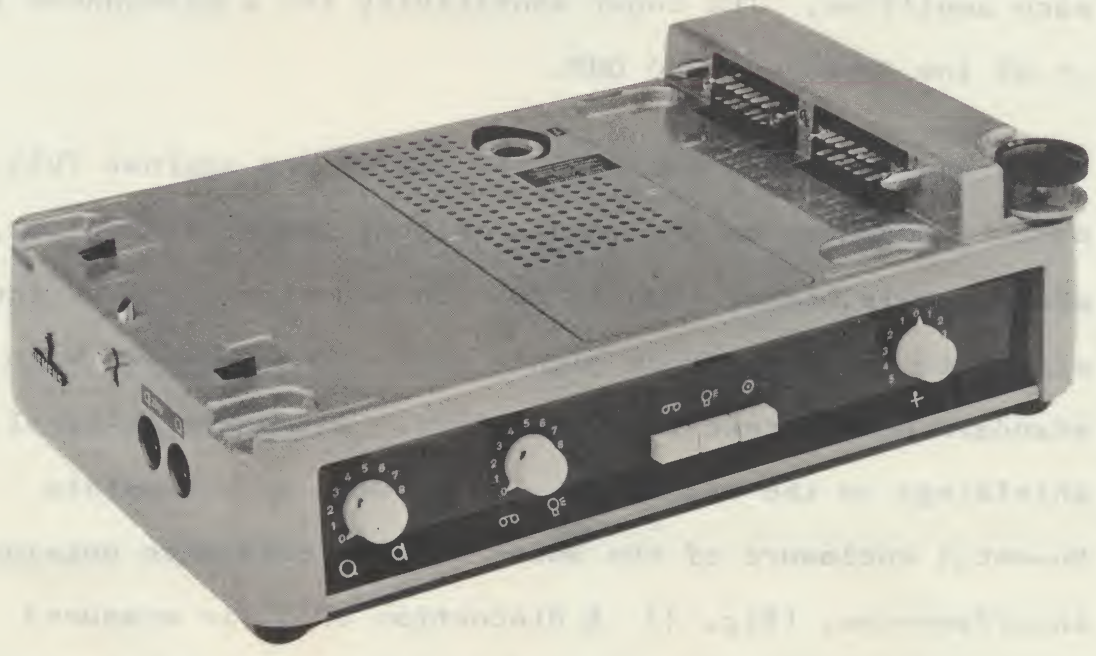


FIG. 5

12 watt plug-in amplifier

than 1% of distortion. All amplifiers work without output transformer. The two power transistors are wired, to receive their DC supply in series and producing the audio signal in parallel phasing. The output impedance is 15 OHM for all amplifiers.

(Fig. 5) All amplifiers have been functionally designed to give maximum operational ease. This has been achieved by incorporating simple push-button for the desired selection. Service can be carried out economically as almost all components are easily accessible. Printed circuit boards may be replaced individually. (Fig. 6) All amplifiers are equipped with a single tone control which in the case of the 12 Watt record and playback amplifier also effects the frequency response while in record position. The increase or decrease of frequency response may be seen from Picture 6. A regulation of plus 5 db and minus 12 db is reached at 12 kc.

7.5 Watt Socket Amplifier

The amplifier is designed for optical and magnetic playback and is simply built into the socket base of the projector. Projector and amplifier mounted into one integral unit having only a weight of 29 lbs. The amplifier cannot be equipped with magnetic recording facilities. (Fig. 7)

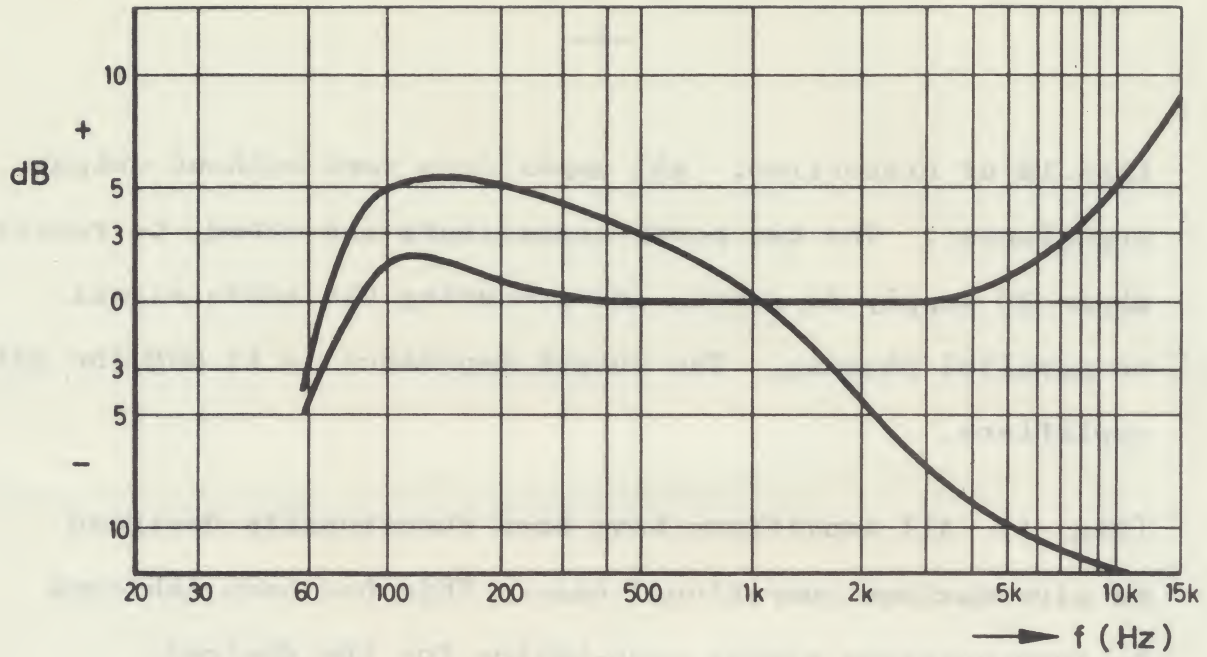


FIG. 6

Frequency curve of 12 Watt record and playback amplifier

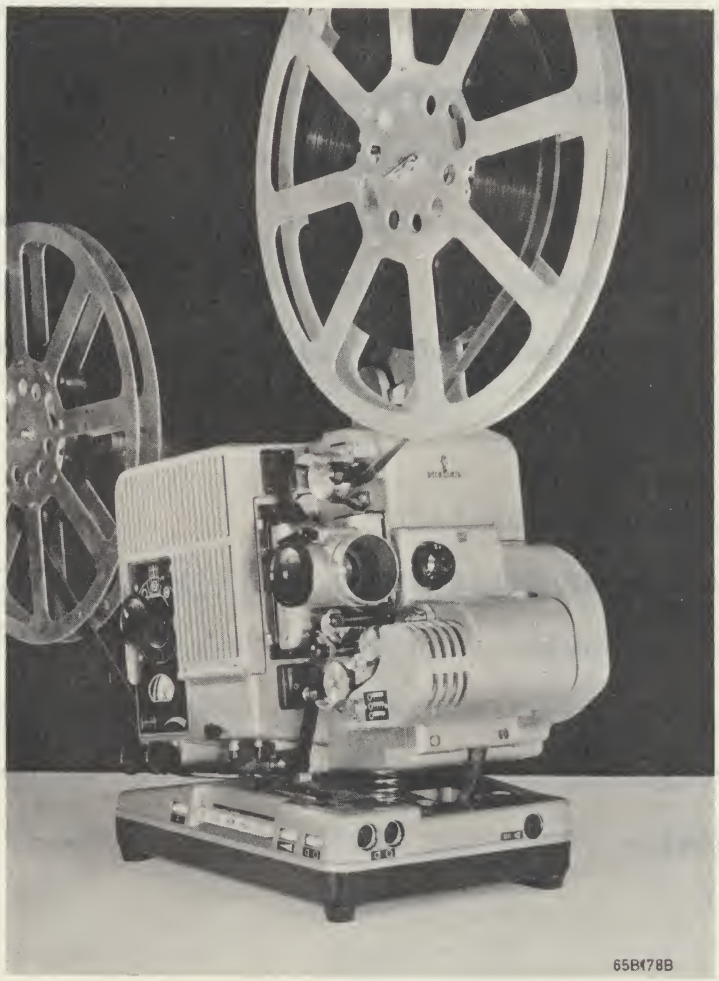


FIG. 7

Projector with 7.5 Watt socket amplifier

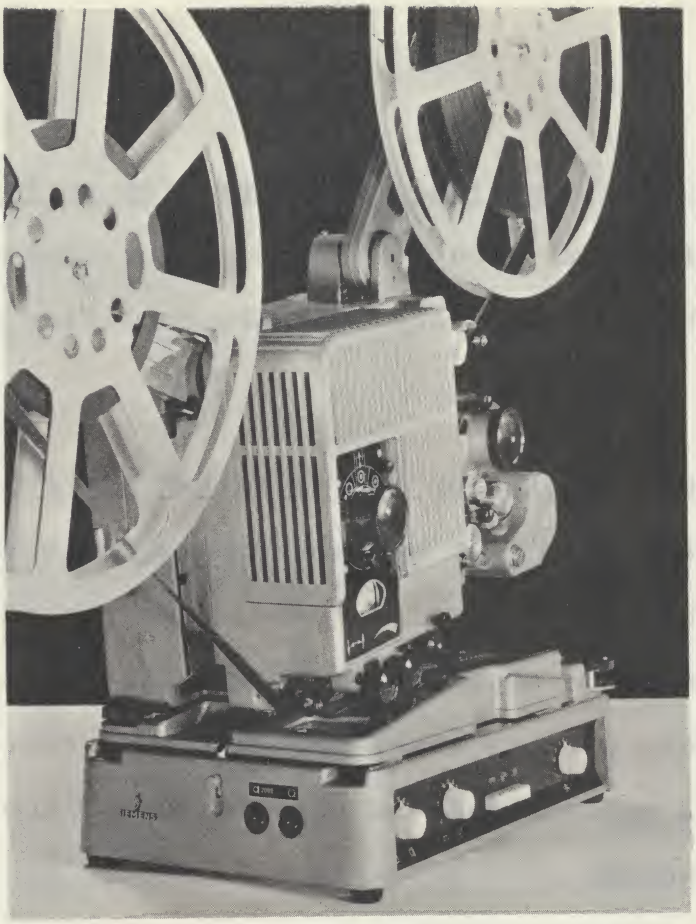
12 Watt Plug-In Amplifier (Refer to Picture #8)

This amplifier has been built into a detachable housing and functions basically as the 7.5 Watt amplifier described above.

12 Watt Socket Amplifier (Refer to Picture #9)

This amplifier may also be used for magnetic recordings. Three mixable inputs are featured. The recording oscillator is installed on a separate board and has an adjustable bias system. This permits super-imposing of magnetic sound tracks or a gradual fade-in or fade-out of the bias to avoid switching noise.

(Fig. 10) This stage principally uses two power transistors wired in push-pull method by using a separate feed-back winding. The amplitude, and therefore, the high frequency bias, for the erase and record and playback head may be altered by adjusting the DC supply of the two transistors which is feed over a variable voltage divider No. P-41 and R-43. The potentiometer P-41 is coupled mechanically to potentiometer P-42 which in turn regulates the audio level feeding the record and playback head. If P-41 is turned down to the minimum, enough DC supply remains so to guarantee a positive start if the oscillator is switched on to record position with S-41. The coupling of the DC supply potentiometer P-41 with



65B177B

FIG. 8

Projector with 12 Watt plug-in amplifier

65B169B

FIG. 9

Projector with 12 Watt socket amplifier

the audio potentiometer P-42 guarantees that the audio level is minimized in the same ratio as the bias of the oscillator decreases. Thus, over modulation is avoided. The recording level indicator is a magic-eye-tube system which also shows the decrease of audio level going to the magnetic recording head if P-42 is adjusted. It's rugged construction, mechanical and electronical reliability makes this equipment suitable in both the professional and amateur fields.

In conclusion, I wish to thank Mr. H. Maschgan of Siemens and Halske in West Berlin for providing the technical information on which this paper has been based.

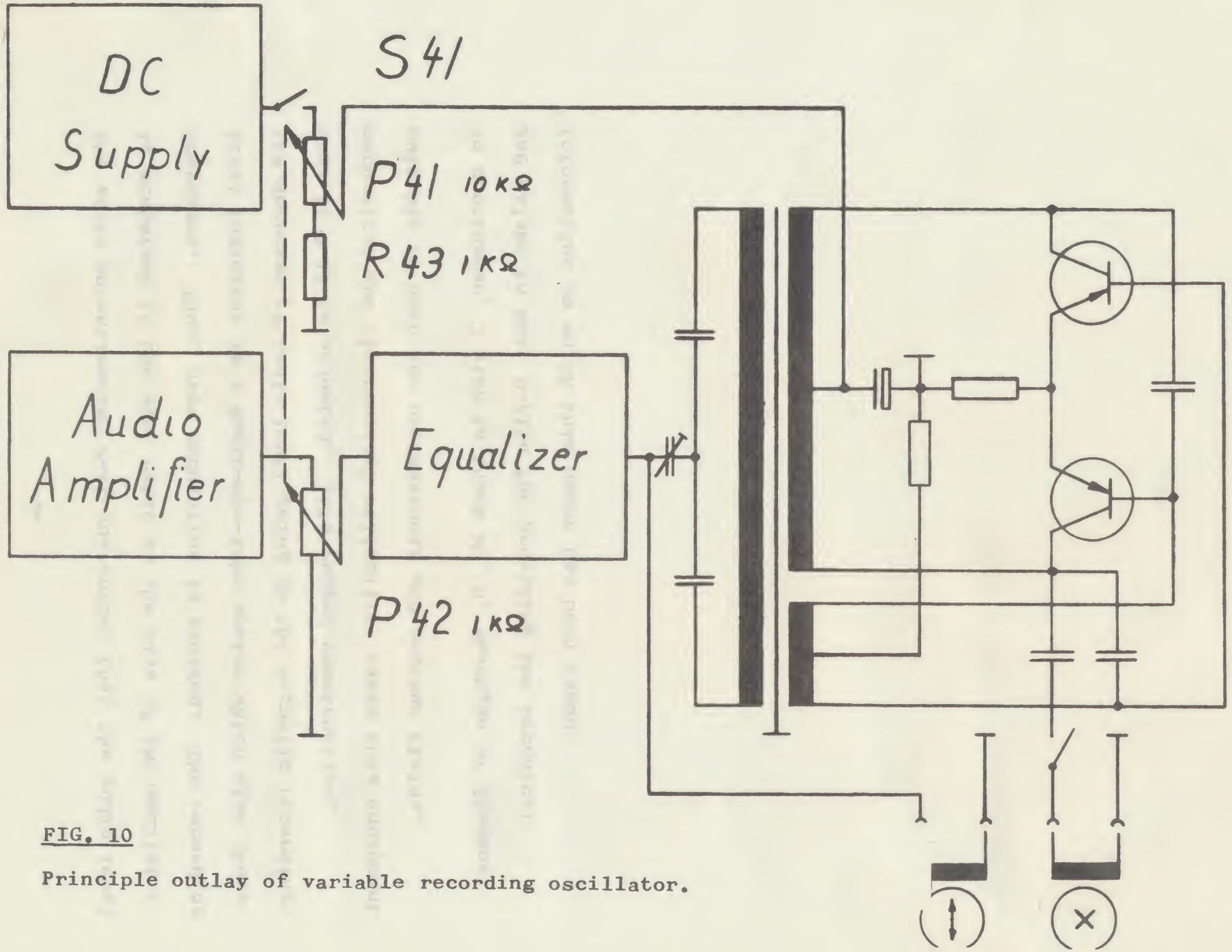


FIG. 10

Principle outlay of variable recording oscillator.